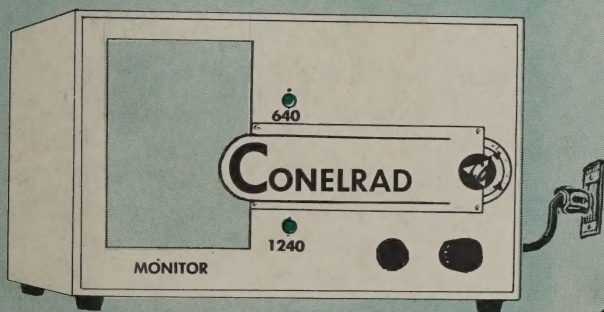


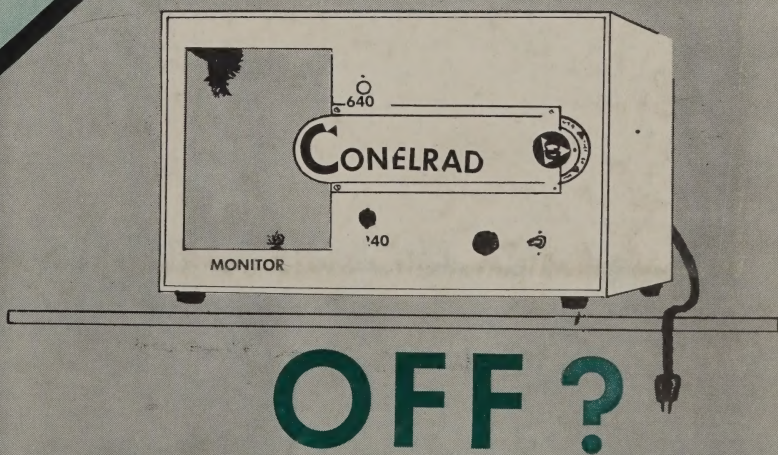
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THIS MONTH

- SY-PEP Awards Page 1
- APCO Conference Page 4
- Conelrad Phase Out? . . . Page 7
- Private Mobile Survey . . . Page 9



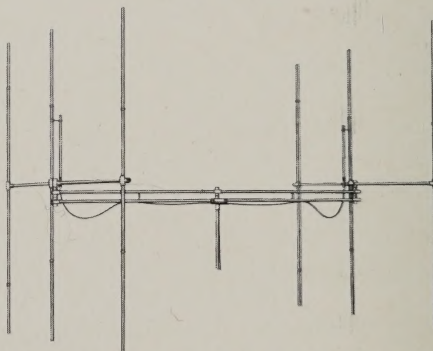
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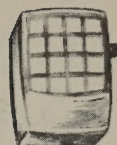
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SPLATTER



Editorial Notes from
Communication Horizons Editor

Robert B. Cooper, Jr., K6EDX

Our Contribution to the Industry

The communication's industry is an explosive entity. Ideas are built upon ideas, experiments built upon experiments, development built upon previous developments. It is an ever changing scene of progress bounded only by man's imagination, his skill with circuits and the needs of the time.

For some years your editor has felt this industry needed an "in-print sounding board" for ideas, and so *Communication Horizons* was borne. Happily, our early pre-printing thoughts have been borne out in practice, our theory proved workable, and here you see the results of that theory.

But by the same token, as we work with the backbone of this industry, we are constantly amazed at the great reserve of ideas which somehow take so long to trickle out of the laboratory and down to the man in the field. So many times we have visited two-way installations to hear a communications man exclaim "I sure wish there was a way of improving this (as he refers to some particular problem he is experiencing in his work)." And so many times we have remarked "why there is a way . . . here let me give you the name of an engineer in Swampscott (or Miami or Dallas or wherever) who has licked this problem . . . I am sure he can help you out."

Whenever such an occurrence besets us (and this is often) we have cause to wonder . . . *How many other two-way operators are faced with the very same problem?*

We have wondered . . . and we have won-

dered, and now we have decided to find out!

Horizons Publications is proud to announce our *Communications Industry Engineering Paper Evaluation Project*, abbreviated (as everything must be these days) CIEPEP, or (pronounced) SY-PEP for short.

SY-PEP is (in a manner of speaking) a contest, without the razz-ma-tazz of box tops, twenty-five words or less and a written promise to be ever faithful to Krinkle Pops.

SY-PEP is a down-to-earth attempt to draw good sound ideas out of the laboratory *and into the field*, where the greatest number of two-way installers, users and servicing personnel can put them to good use.

Here is how it works. *Horizons Publications* invites the submission of engineering papers in any of the categories to follow for judging by a qualified panel of engineers, the complement of which will be announced in our September issue. All papers submitted become the property of *Horizons Publications* for a period of 12 months after submission. Each paper will fall into one of the following categories.

- (1) Systems-Theoretical
- (1b) Systems-Practical and Reports
- (2) Equipment Development-Theoretical
- (2b) Equipment Development-Practical and Reports.
- (3) Industry-Timely

Within these broad outlines the papers may deal with any specific topic, whether it be microwave (private or common carrier), VHF, UHF (point to point or mobile in either category, public safety, commercial, special industrial, etc).

There will be no "minimums" or "maximums" imposed on the papers. That is, the length of the papers will be determined

only by the story that needs to be told. In some cases this may be 500 words, in others, up to or beyond 4,000 words. Some small amount of preference will be given to papers in the under 3,000 word category, to discourage overly long submissions.

SY-PEP will run as a quarterly judging affair, with "best papers" announced in the November, February, May and August issues of *Communication Horizons*. The first judging period closes September 15, 1961; the second judging period closes December 15, 1961; the third judging period closes March 15, 1962 and the final quarter judging period closes June 15, 1962.

Awards

To make the submission of prepared papers considerably less painful, a series of awards have been established to reward the enterprising writers who's work we recognize within these pages.

In the five categories listed above, a "Best Paper" will be selected in each, and a cash prize of \$50.00 awarded at the end of each quarter. On top of this, a "Best Paper of the Quarter" prize of \$100.00 will also be awarded.

At the end of the first year of evaluations the *Best Paper of the Year* in each of the five categories will be awarded a bonus of \$100.00, while the best overall paper of the year will receive an additional \$250.00. In other words, it is entirely possible for you to come up with a total remuneration of \$500.00 for your efforts!

Horizons Publications must reserve the right to declare "no-winner" in individual categories during the various quarterly judging periods, should no noteworthy papers be received within a category.

In addition to the awards program papers which appear in *Communication Horizons* which do not fall into the "winner" category will be rewarded with a \$25.00 check. Papers not used within 12 months from the date of receipt will be returned to the writer.

Now-what could be more fruitful! Here is an opportunity for the man in the laboratory and the man in the field to tell the industry how he has tackled a job, or in the case of categories one and two, how he proposes to tackle a job, and lick the problems it presents. Whether you have ever written before or not, this is your opportunity to create a lot of good will for your firm and receive payment for your efforts as well.

We require only that papers be type written (double spaced) on one side of the paper. Illustrations, photographs and charts are a must if you wish to prove your point or receive serious consideration from judges for awards.

Time is running out on the closing date for the first judging period... September 15th. Fire up your Underwood and Smith Charts... let's see a big turnout of the best thoughts within the industry. You can probably talk your boss into allowing you to work on your submission on company time, because we intend to give full company credit where credit is due.

Before sealing the envelope on your manuscript, jot down a few lines about your own personal history. We want to be sure to pass these pertinent points along to readers when we run your paper within the pages of *Communication Horizons*, "The voice of two-way communication." RBC

ABOUT ADVERTISING CLAIMS

Our growth within the industry is best judged by our circulation figures, and advertising. Last month we devoted the inside back cover to a little chest beating in the circulation department. This month advertising gets its DRUTHERS.

Antennas must be selling awfully well these days! Witness our growth in this phase of the "display-advertising" world.

We are also pleased to report two-way manufacturers (the big name boys!) have thrown their full support behind this — the professional communications magazine.

All of which brings up a sometimes controversial subject... advertising claims.

Our readership is comprised of engineers, technicians, professional (non-engineering) communications men, and a number of users. A goodly portion of these readers are quick to recognize "advertising gain figures" as opposed to "real, honest-to-goodness gain figures."

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As a special reader service, we offer to supply photostats of this information to any reader requesting same. We do not vouch for the validity of the figures merely because we have the figures on file. We do stand ready, however, to exert our prerogative to refuse advertising from any firm which does not wish to conform to this policy.

The Latins have said it... "Caveat Emptor" or... "Let the Buyer Beware."

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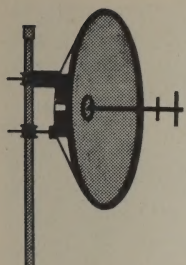
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TABLE OF CONTENTS

FEATURES

MEETING IN LONG BEACH

"Salute To APCO—1961" 4

IS THERE ANY TRUTH TO

"Conelrad Phase Out?" 7

NO WONDER THERE'S INTERFERENCE!

"Private Land Mobile Survey" 9

CONCLUSION —

"15 Kc. Splits — 150 Mc. Band" 14

PUBLIC SAFETY RADIO IN DEEP SOUTH

"Communications in Miami" 24

DEPARTMENTS

EDITORIAL

"Splatter" 1

OUR MAN IN WASHINGTON

"Robert E. Tall Reports" 18

NEW PRODUCTS

"CH Showcase" 26

ON VACATION

"SIRSA Signals; Lab Horizons"

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*Communication Horizons' readers—always the first to know,
the best informed, the first to act."*

Salute to APCO

Communication Horizons takes great pleasure in saluting in this issue the communications officers of the nation's states, counties, cities and towns on the eve of the 27th Annual Conference of the Associated Police Communication Officers, Inc. (APCO) at Long Beach, California.

Probably no group in the history of communications has contributed more to modernizing law enforcement and other public safety activities than has APCO and its members, in establishing and operating the elaborate network of wire and radio communications that link our country's safety operations into a cohesive force to protect the public and enhance civil government.

The August 1-4 sessions of APCO in Long Beach are expected to draw more people who have dedicated their talents (and in many cases their lives) to police and other public safety communications than have any of the previous APCO conferences. And, despite progress in the past, APCO problems have never been more complex than they are this year.

Regional APCO groups from across the nation have been charting the future course of the public safety communications organization in the past weeks, by preparing their positions on resolutions which will have important effects in a number of areas. The delegates, an estimated 500 strong, will cast their ballots on these resolutions at Long Beach.

No organization of the magnitude of APCO has ever gone through twenty-six years of existence without differences of opinion among its membership, and the public safety communications association is no exception. During the months leading up to the Annual conference held in Philadelphia (1960), however, and during the period since last year's conclave, a good many of the more hotly contested differences have been settled within the organization by compromise and the realization that progress does not come easily, and does in fact, sometimes require changes in philosophies. Instinctively, the 1961 meeting has a pre-conference appearance of harmony and a drive to go ahead on basic plans



decided in theory last year.

As president R.J. Evans (Michigan State Police) has pointed out *the APCO conference this year will emphasize many vital and important decisions to the public safety radio field and actions taken at Long Beach will dictate the future trends of the organization.*

Not the least of the problems facing the Conference is the local government radio situation, where a resolution of present frequency assignment complexities would permit the orderly growth of general municipal radio communications, in the public benefit, on a scale matched only on only a few fronts in the entire history of radio communications. The big nut to crack here is the Federal Communications Commission's reluctance to permit local government frequency coordination until the federal agency is assured the coordinating group is truly representative of the radio users it seeks to serve.

From the FCC point of view the APCO delegates will probably be asked to get a little more in the swim with regard to future planning for public safety communications. Chief John J. McCue of the Commission's Public Safety and Amateur Division previews that he's going to point out that the FCC has just about completed its current round of basic rule changes stemming from its own views as to what the future requires in public safety radio communications. McCue expects APCO to come up with some crystal gazing from the radio operations standpoint.

One especially tough contest at the Long Beach meeting looms in connection with a Gulf Coast Chapter resolution posing a change of name for the organization. Gulf Coast offers four possible changes in the title to reflect the *all public safety communications' officials* content of the current APCO membership. One of the possibilities—"American Public Communications Officials, Inc."—is urged in another resolution by the joint California chapters of the organization.

Another question assured of split opinions concerns a revision in the voting procedures of the association.

Whatever the outcome of the problems facing the Conference, witnesses will have seen American democracy at its best. *Communication Horizons* will be there, in the persons of Washington Bureau Chief Robert E. Tall, Associate Editors Art Brothers and Tom Kneitel, and Publisher Bob Cooper.

For those readers unfortunate enough not to be able to attend, a full report on the meeting will appear in the September *Communication Horizons*.
RET

Partial Agenda

courtesy of Foster G. Strong

Chairman, 1961 APCO Conference

In addition to the many business sessions conducted on behalf of the organization, a series of top-flight communications engineers have lined up to participate in a series of special presentations. The entire agenda will appear in printed program form for the conferees. The following tabulation is subject to changes which may occur after press-time.

- **The Future of Solid State Electronics**
By Dr. Daniel E. Noble, Executive Vice President, Motorola, Inc.
- **Consideration of Personality Factors in the Design of Manually Controlled Equipment**
By John F. McGrail, Intellectronics Devices Laboratories, Engineering Department, Ramo-Woolridge, Inc.
- **New Product Developments from C.P.D.**
By General Electric Communications.

- **The Relation of Heat Dissipation to Tube Life**

By John C. McAdam, Vice President, International Electronics Research Corporation.

- **Reliability of Microwave Antenna Systems**

By John D. Cupp, Andrew Corporation.

- **Ignition Noise Suppression Built Into the Receiver**

By William J. Weisz, Motorola, Inc.

- **Modular Approach to Communications Command Consoles for Police and Fire Departments**

By William L. Findlay, Westrex Corporation.

- **Positive Full-Time Ignition Shielding—At the Source**

By Stan E. Estes, Hallett Manufacturing Company.

NON-TECHNICAL PAPERS

The following papers will be presented as matters of procedural interest to APCO conferees.

- **Relation of the American Municipal Association to APCO**

By Robert J. McNutt, Chairman, Radio and Communications Committee, The American Municipal Association.

- **A Review of Developments Since the Philadelphia Conference**

By Joseph Kittner, Attorney for APCO.

- **A Report on Current Commission Actions**

By John J. McCue, Chief, Safety and Special Radio Services Section, FCC, Washington, D.C.

- **Civil Defense—Financial Assistance, Present and Future**

By Eugene J. Quindlen, Deputy Assistant Director, O.C.D.M., Washington, D.C.

- **Law Enforcement and Communications in The Jet Age**

By E. Hanckarik, American Telephone and Telegraph Company.

APCO PRESIDENT

R. J. Evans, Michigan State Police
East Lansing, Michigan



APCO President R. J. Evans recently wrote in the APCO bulletin . . .

"We in the public-safety communications field today find ourselves confronted with outside interests that desire to take over our communications, whether it be wire, radio, microwave or carrier pigeon. NOW is the time we must cooperate with each other and especially with other services in the public-safety field. If we fail to see and grasp the opportunity to plug the gap at this time, we may well lose many of our facilities . . ."

"APCO has some very devoted members who are spending many hours of their time on

committee functions and to these people we should give all the assistance possible. It behooves each of us to put our shoulder to the wheel and even though our efforts may seem infinitesimal at the time, I am sure that by cooperation among our members we will continue to maintain the type of public-safety communications that will provide the maximum protection of life and property to our citizens."

This, we feel, expresses to a "T" the underlying drive and enthusiasm certain to show in Long Beach.

See you there!

RBC

Conelrad Phase Out?

By

Robert E. Tall
Chief, Washington Bureau
Communication Horizons

Sweeping changes in the federal government's handling of civil defense activities under study at the time this is being written could get the Conelrad monkey off the back of the two-way radio communications field. Just as likely, however, is the prospect that another Air Force re-evaluation of the need for Conelrad will come up with the perennial conclusion that we need the program for another year, *at least*.

In the face of rampant rumors in Washington that Conelrad has seen its healthiest days, we posed the question to a number of government officials concerned with the project, and got just as many answers on one side of the question as on the other.

There was a pattern, however. People being transferred *away* from Conelrad supervisory posts were unanimous in their speculation that the Air Force, which is footing much of the government's Conelrad bill, is ready to dump the program, possibly in three or four intermediate "phasing out" steps.

Officials newly moving into Conelrad jobs, on the other hand, felt that the program is here to stay a while longer. Fairly long-time incumbents were about half-and-half.

Our conclusion—don't anchor your boat with your Conelrad monitor until the FCC gives you the word, and this could come this year or next.

There has been speculation for the past three or four years that Conelrad has served its purpose in giving us a reasonably good alerting system during pre-missile days. As late as last year, however, the Defense Department concluded, after re-evaluation, that we still need the program, despite recommendations of an independent study team to the contrary.

The latter study by the Operations Research Office of *Johns Hopkins University*, conducted under military contract, called the nation's air raid warning system "basically unsound" and recommended, among other things, the abolition of Conelrad. The report said the Conelrad mission of denying radio navigation aid to a

possible enemy is largely obsolete because present missiles do not need terminal radio guidance.)

FCC Commissioner Robert E. Lee, who was serving as Defense Commissioner at the time, said the DOD conclusion was that Conelrad *"is a military must for the foreseeable future, perhaps ten years."* He said the FCC was "obliged" to "accept these expert opinions" and "do its best" to provide necessary support.

Where does this leave the two-way radio field?

It is probable that some portions of the program will be around for a while, in view of the large investment in facilities by broadcasters, but it is getting increasingly difficult for proponents of continuation of Conelrad to justify the current blanket scope of the program, and most two-way radio people not personally interested in Conelrad perpetuation—from a job or equipment sales standpoint — have been eager to write it off for some time now.

While attempts to shore up the sagging program—by using Conelrad procedures for emergency weather warnings or dissemination of word of other impending natural disasters —have rekindled sporadic interest in the over-all program from time to time, there is little doubt that Conelrad will meet its end relatively soon, if not this year.

No one in the two-way radio field wants to scrap the "silence" program if it is doing the country any good, but the "Doubting Thomases" are increasing in number at a considerably faster rate than are the radio licensees saddled with getting Conelrad receivers and contributing their part to what is a program of dubious value, at best.

One Louisiana two-way radio sales-service businessman calls the Conelrad program a "waste of time and money," since licensees who have the required receivers "do not know how to operate under Conelrad rules if they actually received the alert warning. In the case of the public safety group, they cannot operate under present rules and cannot shut down either. I find only about one out of five

users have a Conelrad receiver and in most cases it is turned off.”

The operator of a similar business in Maryland says he tells his customers the FCC rules require them to be equipped to receive the Conelrad alerts, “but the customer really does not feel that he needs to spend anything for a monitor since nobody else has one and he doesn’t see the need for the Conelrad program in the first place. To comply with the requirements, many licensees have a cheap broadcast receiver which is turned on only during *baseball games*, or if a Conelrad test is expected.”

While the FCC’s opinion about Conelrad appears to follow the policy expressed by Commissioner Lee, it’s pretty tough to find any individuals at the Commission who will express any thoughts about the value of the Conelrad program.

One of the more respected communications attorneys in Washington, representing a special industrial radio service licensee in an FCC oral argument earlier this year, told the FCC Commissioners that his feeling is that while he does not “want to question the Conelrad rules” of the agency, “many people have,” and a Conelrad violation cannot be considered as “serious” a violation as other types of infractions.

The case was one initiated by the FCC staff looking toward revocation of the company’s license, for, among other things, failure of the license to provide a means for receiving Conelrad alerts. The FCC staff attorney in the case pointed to the “apathy” in the “public mind” with respect to the Conelrad program, and stressed the importance of the system. Assured that the licensee is now in compliance with the Conelrad alerting requirements, the Commissioners reversed an examiner’s initial decision which had recommended the revocation of the license.

The FCC staff, of course, was taking a sound stand in trying to enforce the rules and stave off a bigger breakdown in its regulatory processes, but the two-way radio field is beginning to smolder under the Conelrad yoke, particularly in the absence of any resounding statements from anyone in authority to the effect that Conelrad continues to be necessary.

The fact that the FCC has just—within the past several months—extended Conelrad requirements to some radio services not previously covered by specific Conelrad rules (maritime stations, stations in Hawaii, and

others) cannot realistically be appraised as indicating any desire on the part of the Commission to continue the program. These extensions have been in the mill for some time, and should actually have been made final previously. When the time came for the Commissioners to consider the expansions, there were no current pressures to stop them.

Policy planners in the radio manufacturing business face the same problems, and, while reluctant to base any large part of their companies’ activities on producing Conelrad monitors, they feel they must go along with the program as long as the requirements are there. “To take an official stand against Conelrad . . . it’s like being against motherhood . . .” one representative said.

At the risk of sounding tongue-in-cheek, we urge all two-way radio licensees to comply with the Conelrad requirements—but meanwhile work towards an expression from the government that the rules are still necessary. It seems a little ridiculous to us to have a two-way licensee spend between \$40.00 and \$140.00 for a Conelrad monitor receiver if in fact the only reason for continuation of the program is to provide jobs for the people who are running the show.

RET

ANTENNA CONTEST



Can you identify each of the antennas mounted on this tower by manufacturer’s number? A \$5.00 check to the first subscriber who comes across with the correct answer.

Mail your try to *Antennas, Post Office Box 3206, Modesto, California.*

PRIVATE LAND MOBILE SYSTEMS

IN THE UNITED STATES

This fall a conference of world wide scope will be held in Europe on the subject of communications. At that conference the U.S. Department will be represented by a "Panel of Experts" in the communications field. One of the many papers prepared for presentation at this world-wide affair is previewed here for Communication Horizons readers. The original paper was drafted by "The Land Mobile Communications Section of the Electronic Industries Association (EIA)."

In the United States, land mobile communications started with the initial Federal regulation authorizing portable stations to use HF frequencies in the 1 and 2 mc. range in 1928. In the early 1930's the Emergency Police Radio Service and the Miscellaneous Radio Service were established using HF frequencies. The Land Mobile Services grew rapidly and soon saturated the limited number of HF Land Mobile frequencies. With the impetus of World War II, frequency modulation on VHF frequencies began to replace HF AM mobile systems. Effective September 1, 1941, the FCC permitted FM in the 30-40 mc. band for Land Mobile. Finally, after adoption by the United States of the Atlantic City International Treaty of 1947, the Land Mobile Services completed the conversion from HF to VHF frequencies. Since 1947 the land mobile services have occupied the 25-50 mc, 152-174 mc, and 450-470 mc. bands.

During the past decade the land mobile industry has grown rapidly and predictions in-

dicate that it will continue to grow at a substantial rate.

*In 1948 there were 86,000 transmitters
In 1958 there were 695,000 transmitters
In 1963 there will be 1,390,000 transmitters
In 1968 there will be 2,650,000 transmitters
In 1978 there will be 5,000,000 transmitters*

Today, in the United States, approximately 99 percent of the land mobile users are satisfying their need for communications in the VHF and UHF portion of the radio spectrum.

The radio spectrum, a vast natural resource, has a utility which is only partially tapped in its capacity to satisfy the human requirement for communication. This natural resource has the unique quality of not being consumed by its use. Regulation of most other resources purposely restricts the rate of consumption in order to preserve the commodity which, if not used, remains for future generations. In contrast, waste results when the radio spectrum is not used to its fullest extent.

Private mobile radio systems have the ability to satisfy the vehicular communication demand of America's industrial complex and governmental public services, regardless of location. Although the use of mobile radio generally follows population trends, its important utilization is not adequately reflected by a cursory study of channel occupancy in large urban areas. The use of two-way radio can be as much or more in the public interest on a large wheat farm in a remote part of Kansas, utilizing just a few mobile units, as compared to a large service company with a hundred radio equipped trucks operating in New York City. The maximum theoretical utilization of the radio spectrum would be the occupancy of every channel every minute of every day. The maximum practical utilization

of the radio spectrum is something much less. It is not difficult to assess the tremendous public benefit that accrues from almost 1,000,000 private land mobile transmitters operating from coast to coast.

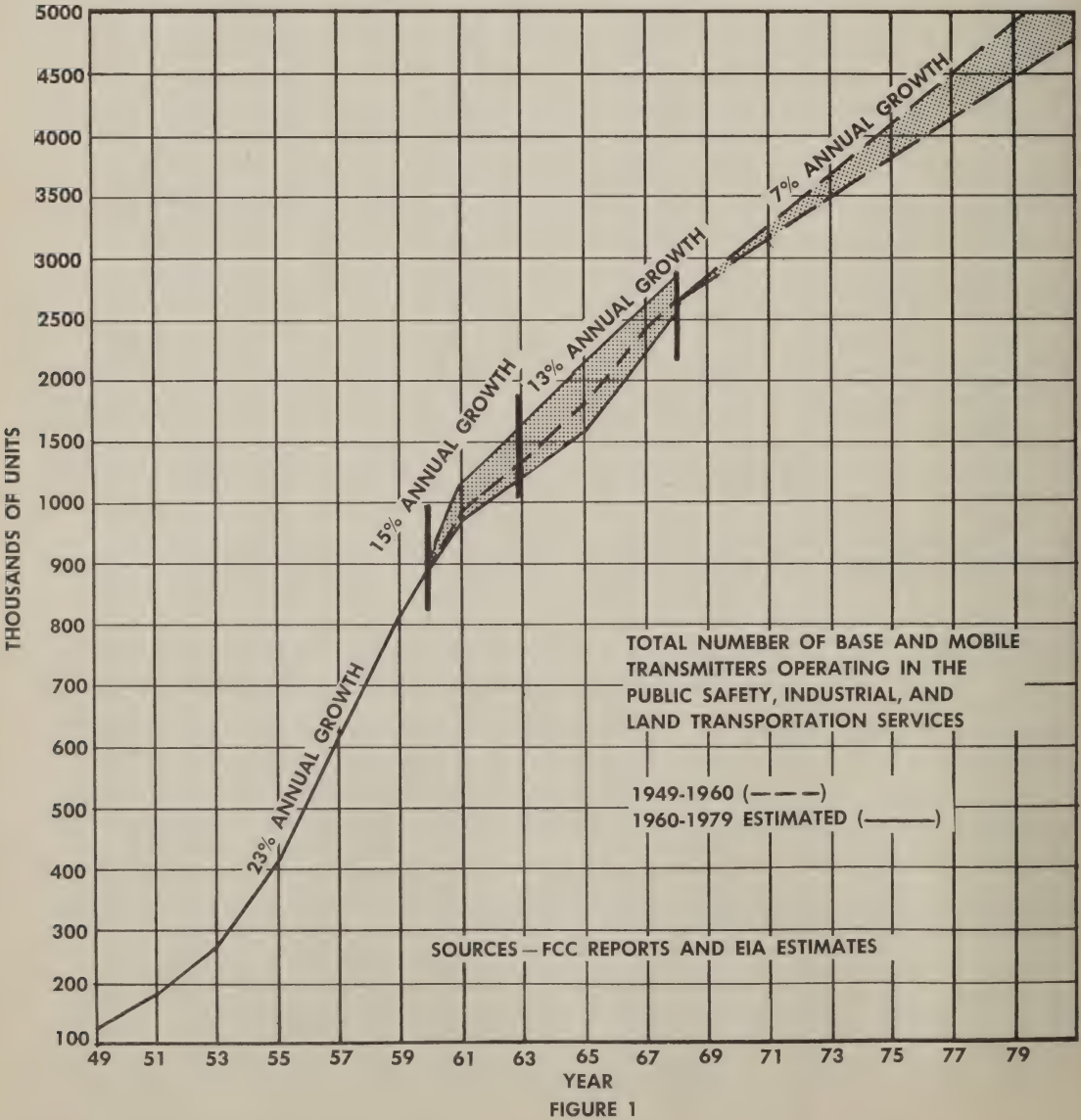
Mobile radio has experienced a phenomenal rate of growth within the past ten years. This growth has been, thus far, accommodated within less than five per cent of the radio spectrum between 25 and 890 mc. Using 1947 figures of actual transmitters in service (approximately 35,000) it can be shown that a 510 percent increase occurred between 1947 and 1952. However, between 1947 and 1958, this increase was 1700 per cent. This expansion is ample evidence that

land mobile communications is a vital part of our economy from both a commercial and safety standpoint. The increase in land mobile transmitters is accelerating with each passing year and EIA foresees every indication of a continuation of this trend.

Chart No. 1 depicts the actual growth between 1949 to 1958 in the number of transmitters in the private land mobile radio services in the U.S. This curve includes only base and mobile transmitters in actual service and the numbers are appreciably lower than those shown as authorized mobiles in FCC records.

Technical Considerations

The radio spectrum should be considered to have three dimensions: First, the frequency



spectrum can be divided into frequency slices, thousands of them, and each slice can be used for a different communication purpose. Second, it can be considered to have a time dimension; a frequency slice for one communication at one moment may be re-used for a different communication a moment later. Finally, the spectrum may be considered to have a space dimension. A given frequency slice may be assigned in Washington for one function and may be reassigned in New York for another. Or, in cases of highly directive systems, it is possible to reassign the same slice a number of times in the same geographic area. Thus, we see the radio spectrum has dimensions of frequency, time and space. Efficient use of the spectrum requires stewardship of all three dimensions.

Frequency Dimension

A great deal of information regarding propagation in the VHF and UHF frequency bands has been obtained. We have found that frequencies near 800 megacycles are not as well-suited for land mobile communications as frequencies near 500 megacycles or lower. We find considerable difficulty at the higher frequencies in getting the complete signal fill-in due to multipath reflections. The basic principle, however, of allocating certain bands of frequencies to serve the varying requirements of different categories of uses is still sound today. In the U.S. three bands of frequencies are in use by the land mobile users: one near 50 megacycles to serve the requirements of the long range mobile communications; one near 150 megacycles to serve the medium range requirements; and, finally, one near 500 megacycles to serve short range urban requirements. This latter band of frequencies does not today provide equal performance to the 150 megacycle band frequencies, even in urban areas. We expect, however, that break-throughs, such as the parametric amplifier, will provide a superior service in the future in this frequency band.

In order to obtain better and better utilization of our limited radio spectrum, the mobile radio user has gradually squeezed his channelization down so that he is now using less spectrum for each communications channel than any comparable service. Present equipment is capable of 50 kilocycles in the 450 megacycle band, 30 kilocycles in the 150 megacycle band, and 20 kilocycles in the 25-50 megacycle band. This result has been achieved through careful attention not only to the modulation spectrum emanated, but

also to the receiver characteristics and undesired transmitter radiations.

The spectrum used by frequency drift is very small compared to the spectrum required for the information being transmitted. It is not considered possible to obtain material improvement of spectrum utilization in the Land Mobile Services by further tightening of the frequency tolerance. The frequency tolerance now commonplace in the land mobile field is equivalent to keeping time with an accuracy of one second in two months. No useful benefit will be gained and economic hardship would result, if this accuracy were to be improved at this time. Present FCC standards on frequency stability in the private land mobile services are as follows:

Time Dimension

From the standpoint of the time dimension, optimum use of the radio spectrum could be obtained if communications on each channel were interleaved from a time standpoint so that there would be no dead time on any given channel in a given geographic area. This high degree of utilization is approached on many land mobile channels in densely populated areas. High usage is made possible by a two-frequency simplex system whereby the mobile transmitters are on a different frequency from the base transmitters so that base station competes with base station and mobile unit competes with mobile unit, rather than base station competing with mobile unit. Two-frequency simplex or semi-duplex system operation is recommended in those areas where many co-channel users must share the same channels.

At the present time, the systems devices available to the land mobile users do not provide appreciable improvement in the time utilization of the channels. In some cases, selective calling affords some improvement by singling out the desired mobile unit and thus avoiding lost time due to repeat calls. Tone squelch systems provide an improvement through improved human engineering. Tone squelch singles out the mobile units of a given system and thus protects the user from the nuisance interference created by mentally sorting out all the calls directed to other systems.

Space Dimension

Ideally, one would like to limit the coverage of a given land mobile system to that area required by each user. While some benefit can be obtained to this end by power limitations and antenna directivity, experience has

shown that the vast majority of land mobile systems require more coverage, rather than less, and that the coverage requirements grow as the utilization of radio becomes more and more an integral part of an operation. Experience has also shown that economics provide a natural limitation to the system coverage.

We recommend that two-frequency simplex or semi-duplex operation be permitted in those services where optimum utilization of the frequency spectrum is required from both a time and space standpoint. Two-frequency simplex will permit geographic intermingling of mobile units on the same frequency without necessarily creating mutual interference. (This system of operation is also widely used in Britain and Europe.)

In some cases, system devices may be employed to improve geographic utilization. A reasonable amount of antenna directivity is inexpensive and will naturally be employed by the user, by doing so, he can provide better coverage with less power within his opera-

tional area.

The best geographic use of the frequency spectrum would be obtained if we had a system of frequency allocation which would permit re-use of frequencies in contiguous geographic areas. Implementation of this type of frequency allocation would require formulation of criteria for geographic limits, establishment of priority policies, and automatic frequency allocation by means of computer processing of filing data. It is anticipated that techniques such as these will become practical in the not too distant future and will permit considerably improved utilization of our frequency spectrum.

Conclusion

The tremendous acceptance and utilization of VHF frequencies in the United States by the land mobile services should be made known to all world administrations in an effort to relieve HF frequencies. It is generally accepted in this country that frequencies above HF actually provide superior land mobile systems.

In the United States the average base-mobile range in the three VHF-UHF bands in today is as follows:

<i>Frequency Band</i>	<i>Antenna Height</i>	<i>Base Station Power Output</i>	<i>Base-Mobile Range</i>
40 Mc.	200 ft.	250 w.	45 mi.
160 Mc.	200 ft.	250 w.	33 mi.
450 Mc.	200 ft.	250 w.	20 mi.



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15 KC SPLITS

in the 150 Mc. Band

Are 15 Kc. Splits Better Than Co-Channel Operation?

(Conclusion)

In part one of this two-part paper Engineer McCormick discussed the problem of "finding enough radio frequency channels" to serve the growing needs of the VHF spectrum. Computations and charts were presented which showed that receiver selectivity would appear to be the limiting factor in making 15 kc. splits perform.

This concluding portion points up a practical case where 15 kc. splits have been made to work successfully, in a Dallas, Texas installation.

Figure five shows the severe loss of mobile talk-back range when a desired and an undesired station are operated on the same frequency (co-channel) within five to fifteen miles of each other as compared to a situation wherein the two stations are given a separation of 15 kc. Mobile units in each case operate on the same frequency as their associated base station. Without an interfering station on the air the normal range over which a 50-watt station will deliver a one microvolt signal to the mobile receiver (or vice-versa) is twenty-three miles.

The lower curve shows that the loss of talk-back range, due to the operation of a co-channel interfering station is quite severe. If the stations are five miles apart, the talk back range to the desired station is only 1.6 miles. With fifteen mile spacing between the two stations, it is only 3.2 miles.

When the two systems are spaced by 15 kc. however, the mobile talk-back range under average modulation conditions is nearly as great as though there were no interfering station on the air at all. Even when the two stations are only five miles apart, the talk-back range is reduced only from twenty-three to thirteen miles under average modulation conditions. Summarizing, it can be seen that there is about an eight to one improvement in

talk-back range using 15 kc. spacing as compared to co-channel operation. There is at least a five to one improvement even when the interfering station is modulated well into the limiting region. If one had a choice of operating on the same channel with another system, or of selecting a tertiary frequency, it can be seen that the obvious choice would be in favor of the tertiary frequency.

Figure six shows the range over which a mobile unit would receive interference as it approached a 15 kc. adjacent-channel station under conditions of average modulation and heavy modulation of the interfering base transmitter.

If the desired and undesired base stations were separated by 15 miles, the undesired carrier would cause interference over a radius of half a mile, while average modulation would interfere over a radius of 2.6 miles. Heavy modulation would be detectable somewhat beyond 3½ miles from the interfering base transmitter.

Note that the closer the two stations are located to each other, the smaller the range over which interference to mobiles will occur. This is obviously true because the desired signal will be relatively stronger than when, say, fifteen miles of separation prevails. On the other hand, if the base stations are too close together, they will interfere with each other. In the Go-Crete-Uvalde systems, base

Interference Ranges—(6 db. Degradation of 12 db. Sinad) Narrow Band—50 Watt Transmitters 100 foot Antenna

	Base to Base		Base to Mobile	
	High Band	Low Band	High Band	Low Band
Co-Channel	56 Miles	62 Miles	29 Miles	40 Miles
15 kc. Split	15 Miles		3.5 Miles	
30 kc. Split	0.2 Miles		0.2 Miles	
10 kc. Split		45 Miles		28 Miles
20 kc. Split		3 Miles		1½ Miles

Figure 7

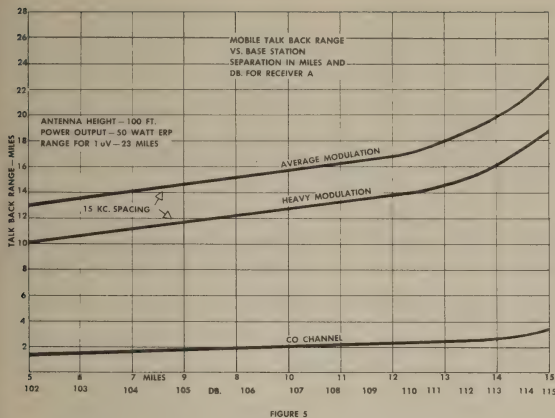


FIGURE 5

Figure 7 is another way of looking at the comparison between co-channel versus 15 kc. and 30 kc. offset operation. We see that two co-channel 50 watt base stations with 100 foot towers will interfere with each other at a distance of approximately fifty-six miles. If they are displaced 15 kc. from each other, the interference range drops to 15 miles, while with 30 kc. spacing it is less than 0.2 of a mile. Base-to-mobile interference range, co-channel, starts at 29 miles, while at 15 kc. displacement, interference drops to 3.5 miles. With 30 kc. displacement interference range is less than 0.2 of a mile.

The tabulation also includes low-band comparisons based on co-channel operation and 10 kc. and 20 kc. splits.

Figure 8 is a map of the Dallas Fort Worth area showing four stations in the special industrial radio service operating within 15 kc. of each other. The Go-Crete station around which we made the field tests is in the lower right hand portion of the map and operated on 152.885 megacycles, a tertiary frequency licensed under a developmental grant. It employed a 50-watt transmitter and a 100 foot steel tower, but some of the elevation was not realized because the plant is located in a natural depression. A 5.8 db. gain omni-directional antenna was employed with approximately 150 feet of RG-8/U transmission line. We credit this station with an effective radiated power of 50-watts for purposes of evaluating our tests. Another Go-Crete station in the system was located approximately twenty miles to the west at Arlington. Northwest of the Go-Crete station at Dallas is the Uvalde base station operating on 152.900 megacycles, that is only 15 kc. removed from Go-Crete. It has a 150 foot tower with a 5.8 db. omni antenna and enjoys somewhat higher ground

elevation than the Go-Crete base station. stations are 9.3 miles apart and at that distance, do not interfere with each other.

Also, RG-17/U transmission line is employed. Approximately twenty miles to the west of the Go-Crete-Arlington station, Consolidated Vultee operates a base station on a 152.870 mc., which is 15 kc. below the Go-Crete frequency.

The stations between which we would expect the most interference are those of Go-Crete Dallas and Uvalde. The actual distance between the two is 9.3 miles and we measured a propagation loss between the two stations of 119 db. Over plane earth for 9.3 miles we would normally expect about 107 db. attenuation. The additional loss in this case is probably due to the radio path traversing the heavily built-up down-town area of Dallas.

To the best of our knowledge there were no complaints of interference between any of these systems in the Dallas area save that of the Cooper wide-band set. Undoubtedly the mobile units could and did get into interference situations as they approached other system base stations but these cases were sporadic and probably went unnoticed.

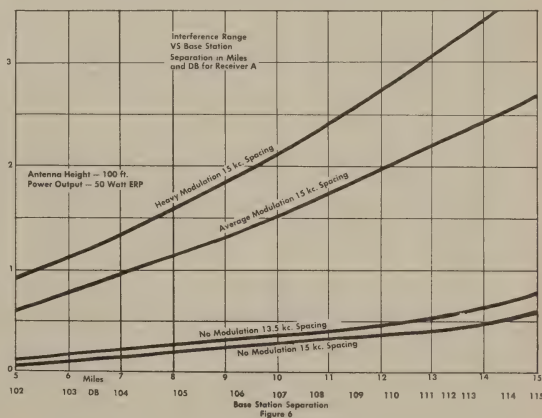


FIGURE 6

Six series of field tests were made using the Go-Crete Dallas station as a source of interference. A station wagon was equipped with laboratory test equipment and two complete mobile combinations which provided for transmission and reception of the three frequencies involved in the Dallas area pertinent to this study. One of the test mobile receivers (receiver B) was designed for operation on 30 kc. channel spacing—the other, still more selective, was designed for either 30 or 15 kc. channel spacing (receiver A). The actual selectivities of these two receivers was given in Figure 2 last month, and is repeated here.

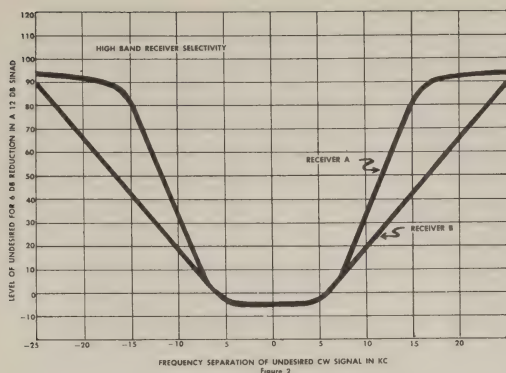


Figure 2

In the first series of tests, the objective was to determine the degree of interference the Go-Crete station would cause mobile receivers operating 15 kc. above and below the Go-Crete frequency in the absence of any desired signal with the test car preceding away from the Go-Crete station.

The 15 kc. receiver (A) experienced squelch opening on voice peaks only at 0.4 miles. At one mile this effect had disappeared and receiver A was free of interference.

The 30 kc. receiver (B) reproduced understandable voice out to one mile. Voice peaks caused intermittent squelch opening at two miles.

In the second series of tests, the objective was to determine the degree above and below its operating frequency while those receivers were responding to a weak desired signal applied by a local signal generator in the station wagon. The level of the desired signal was 1.8 microvolts modulated at 1000 cps for easy recognition.

At 0.4 miles receiver A was measured to have a protection of 60 db. against the interfering signal. Receiver B showed 48 db. protection. At one mile receiver A provided 48 db. protection; receiver B 43 db. at the two mile test points receiver A was free of any measurable interference while receiver B provided 44 db. protection and required $4\frac{1}{4}$ microvolts to deliver a clear, thousand cps modulated, desired signal.

At three miles receiver B was measured to provide 40 db. protection and 3.6 microvolts of desired signal was required to completely override the interference. This concluded the second series of tests. It is estimated that receiver B would be completely free of interference at three and one-half miles.

In the final series of tests, the objective was to determine the effect of operation *beyond* the 0.0005% frequency tolerance of present

day narrow-band transmitters and receivers. This would add up to $1\frac{1}{2}$ kc. at 150 mc. but we actually retuned the receivers *two* kc. closer to the interfering frequency. As expected, off-frequency operation rather seriously degrades the interference rejection capabilities of 15 kc. systems. The 6 db. slope of the transmitter spectrum indicates that the degradation should be about 6 db. for each kc. off-frequency. Receiver A was free of interference at about three and one-half miles but receiver B still experienced slight interference at a 4.8 mile test point.

The use of tertiary frequencies is much to be preferred over co-channel operation because the carrier is offset 15 kc. to a point where it falls on the knee of the selectivity curve of a well-designed receiver at the knee, the well designed receiver will have an attenuation of approximately 80 db. Although 15 kc. displacement is not sufficient to prevent a portion of the modulation side-bands from entering the receiver pass-band, none-the-less, considerable protection is afforded. The curves in Figure 3 (July CH) showed that under on-frequency operating conditions, tertiary frequencies will provide 72 db. protection as far as the carrier (due to its noise spectrum) is concerned and 36 db. protection against the modulation sidebands. Thus we see that we have the maximum protection to the interfering component which is the most troublesome and the most constant.

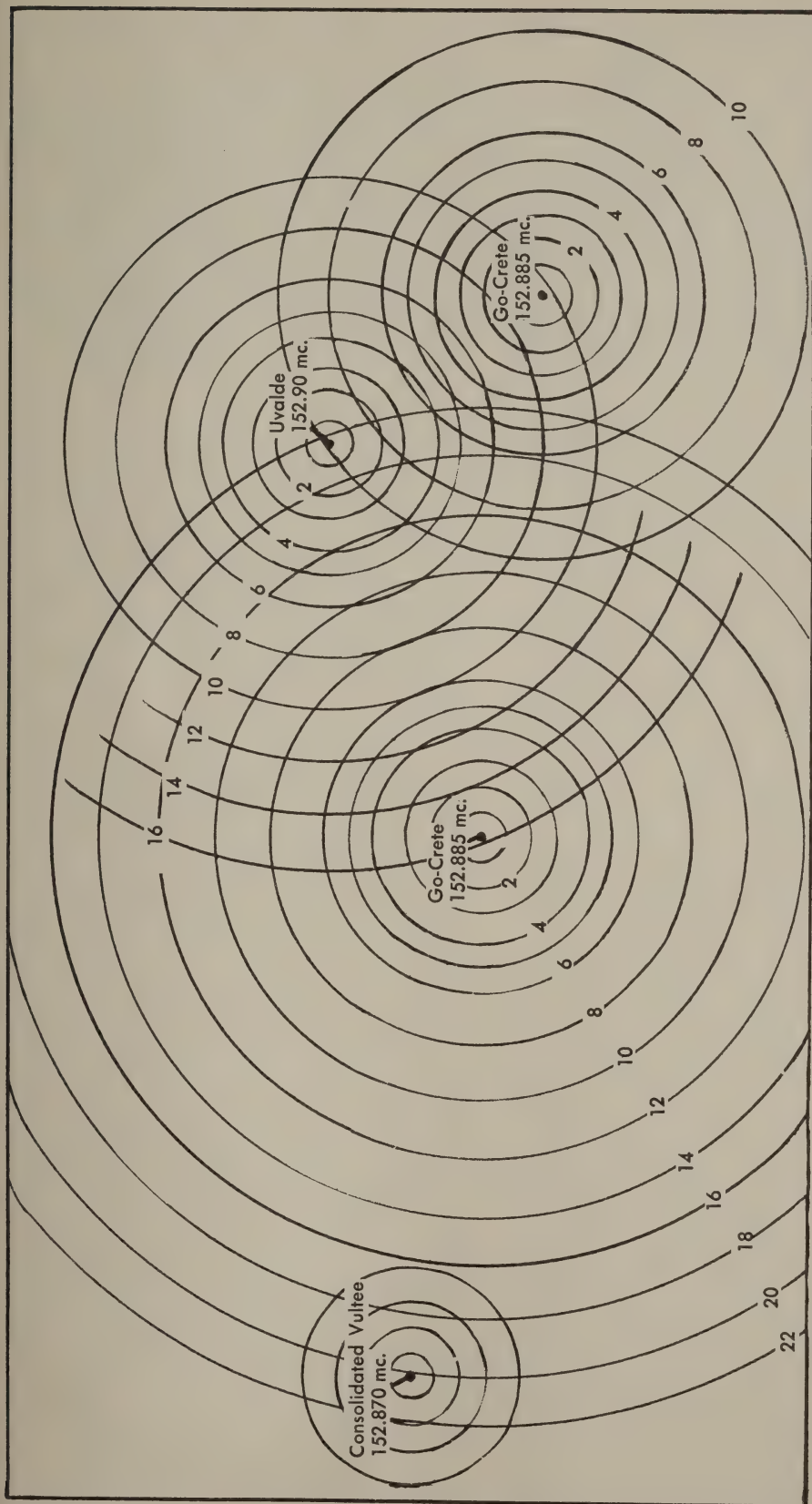
Inasmuch as the interference level varies all the way from 36 to 72 db. we can expect a similar wide variation in the range over which interference occurs. For example, if the carrier noise created interference over a radius of half a mile from an interfering station, the modulation peaks can cause interference anywhere from two and one-half to three and one-half miles. And these laboratory predictions were very well borne out in the Go-Crete field tests.

Another way of comparing co-channel operation with 15 kc. adjacent channel operation is to say that with 15 kc. spacing, interference is reduced by 36 to 72 db. and this is equivalent to reducing the output of 50 watts to 4 microwatts.

Acknowledgment

The performance curves in this paper were prepared by N. H. Shepherd, Advance Engineering Section, Communication Products Department, General Electric Company, whose assistance is gratefully acknowledged.

JM



GO-CRETE — DALLAS
 Antenna Height 100'
 Antenna Type — 5.8 db. Omni
 Base Station Power 50 w.
 Mobile Power 30 w.

GO-CRETE — ARLINGTON
 Antenna Height 100'
 Antenna Type — 5.8 db. Omni
 Base Station Power 50 w.
 Mobile Power 30 w.

UVALDE CONSTRUCTION
 Antenna Height 150'
 Antenna Type — 5.8 db. Omni
 Base Station Power 50 w.
 Mobile Power 30 w.

Figure 8

OUR MAN IN WASHINGTON



Manager of Communication Horizons' Washington Office, Robert E. Tall, reports on the past month's communication activities.

Unrelenting FAA Goes Ahead With Plan

... Towers, Towers and More Towers

All attempts by the EIA, FCC and "hundreds" of interested parties to postpone or modify the FAA tower regulations, scheduled to go into affect July 15, have apparently been defeated. Under the newly announced FAA regulations, all towers over 150 feet in height, or within certain restricted zones close to airports, will need clearance by the Federal Aviation Agency *before* applications can be made to the FCC for a radio license covering that tower. Unknowingly, the FAA has created a monster, but here is how it proposes to handle the situation.

FAA administrator N. E. Halaby announced the regulations as being "designed to insure the safety of air navigation and the efficient use of the navigable airspace by establishing rules, procedures and criteria for determining potential hazards to air navigation which might be created by proposed tall structures."

The new regulations do not affect existing structures, except in cases where "an alternation to a structure is planned."

While there is every indication the new regs (FAA-626) will be appealed, here is how the matter stands at present.

(A) Prospective radio applicants seeking tower structures in excess of 150 feet will be required to file on "Form FAA-117" details of the proposed structure (or modified structure) at least thirty days *prior* to the filing for a radio station license with the FCC.

(B) FAA rules pertaining to the new regulations appear to be premature, in that definite

guide-lines are missing from the announced rules. For example, it is not clear whether an applicant proposing to erect a one foot antenna on top of a 150 foot building must file FAA Form 117.

(C) The FCC, having fought the FAA tooth and nail over the regulations, is by no means throwing in the sponge. FCC representatives have quietly stated they feel the FAA has "*no concept whatsoever of the gigantic task it has inherited.*"

The Commission itself is considering:

1. A formal petition by the agency.
2. Modifying existing antenna height regulations to *get around* what is considered to be an unrealistic situation created by a "sister agency."
3. Turning "all antenna applications" over to the FAA.
4. Processing, jointing with the FAA, all antenna applications.

Other groups, such as the EIA Land Mobile Communications Section, met with the FAA in an effort to seek some type of relaxation of the new regulations. The answer was always the same... the FAA is standing firm on its apparent new found power.

The battle over antenna height clearance has been long and quite drawn out. Originally the FAA sought regulations to control the suddenly mushrooming TV broadcasting towers which the aviation agency had watched creep from 500 feet to 1,000 feet, then 1,500 feet. Now many broadcasters are threatening towers to 2,000 feet, and the FAA wants control over the situation before surprised pilots find themselves "looking up" to "Super Power on Channel 4" signs.

The unfortunate communications industry has been caught in the middle of what eventually turned into an inter-agency battle between the FAA and FCC.

To conform to the new regulations, here is, apparently, what you must do. First of all, obtain Form FAA 117 from the nearest regional FAA office (one Washington based radio equipment representative caused some consternation at the FAA office there when he requested immediately 5,000 copies of the form!).

The FAA regulations require that a notice (filing) be made to that agency for:

(1) Any structure which would be higher than 150 feet above the construction site ground level, or above mean sea level where the structure will be situated over water.

(2) Any structure within 15,000 feet (slightly under three airline miles) of the boundary of any airport or other landing area, excluding heliports, which would extend above such airport or landing area elevation, or above the construction site ground level or mean water level where the structure will be situated over water, whichever is higher, more than one foot vertically for each 100 feet or fraction thereof of the horizontal distance from the structure to the airport or landing area boundary.

(3) Any structure within 5,000 feet of the boundary of any heliport which would extend above such heliport elevation, or above the construction site ground level, or water level, where the structure will be situated in or over water, whichever is higher, more than three feet vertically for each 100 feet or fraction thereof, or the horizontal distance from the structure to the heliport boundary.

(4) Any structure which would extend into an "airport or landing area approach plane."

(5) Any structure within 500 feet of the centerline of any runway.

(6) Any structure more than 500 feet from runway centerline which would project above an inclined plane extending upward from the ground from a base line 500 feet either side of a parallel with each runway centerline, sloping upward and away from the runway at a ratio of one to seven to a height of 150 feet above airport elevation.

(7) Any structure which would project above an inclined plane which extends upwards and away from the outer edge of an "airport or landing area approach plane" at a ratio one to seven until it intersects the limits described in (2) but not to exceed a height of 150 feet above the airport elevation.

Notification on Form 117 are required in triplicate, and the notices are mailed to the "Chief, Air Traffic Management Field Divi-

sion" of the nearest regional FAA office, or to the "Chief, Airspace Utilization Division, Federal Aviation Agency, Washington 25, D.C."

Merely filing the application is no guarantee that you will get acceptance, but then that is another story.

It is remotely possible, incidentally, the regulations will be changed, as the forces opposing these "regulations" are by no means out of ammunition.

Filing Fees for Licenses

... They Won't be Cheap!

Details of current FCC staff recommendations for a schedule of "filing fees" for license applications—a plan which has been in and out of the mill for a number of years—were published in early July. It has been no secret that the Commission has been working on the "filing fee" plan again, under a Budget Bureau directive, and FCC Chairman Newton R. Minow has publicly expressed his support for such a proposal.

The latest draft of the filing fee schedule to be placed before the FCC Commissioners contemplates recovery by the agency of the full FCC budget and an added amount for office space. All filing fees would be payable at the time of filing and would be charged regardless of whether the application is granted, designated for hearing, or otherwise handled.

For the safety and special radio services, under the current draft, applicants would have to pay \$20.00 for most licenses. Exceptions would include \$5.00 for Amateur, RACES and disaster service licenses, and an additional \$5.00 for specially requested amateur calls.

Common carrier domestic public land service applications for initial construction permits would carry a \$300.00 charge, including base station and associated mobile units. There would be a \$200.00 charge for common carrier point-to-point microwave service; \$100.00 for local television transmission service; and \$10.00 for rural radio or domestic public land mobile individual user units. For renewals, costs would be \$150.00 for domestic public land mobile service systems; \$100.00 for point-to-point microwave service; \$50.00 for local television transmission service; and \$5.00 for rural or domestic public individual user units.

Indicating that study people are not necessarily afraid of announcing big fees, reported assessments for TV broadcast station would run to \$6,000.00 per!

Senate OK's Small Fines

... \$100.00-\$500.00 Assessments Seen

Once again the U.S. Senate has approved and passed without fanfare FCC sponsored legislation which would give the communications agency power to levy small fines on individual non-broadcast station licensees for "relatively minor violations" of FCC rules and regulations. In passing the measure, the Senate duplicated a similar action of two years ago; at that time the House allowed the measure to die. This year however the legislation is considered by many to be of "highest priority" as far as the Commission is concerned.

When the Commission transmitted the requested measure to Congress in April it noted "the marked increase in the number of relatively minor violations of its rules in some of the newer private services represents a very real menace to the orderly use of the radio spectrum and to efficient regulation by the Commission." The Commission also noted "existing sanctions are inadequate to handle the situation."

Under the bill, forfeitures ranging from \$100.00 to \$500.00 could be levied against both the operators and the licensees of non-broadcast radio stations for violations of twelve specific points.

California MMC's Fall Under State Control

... PUC says "Join Us"

The California Public Utilities Commission has wound up the first phase of a nearly year-long study of mobile radio operations in the state, and formally asserted jurisdiction over miscellaneous common carriers. Additionally, guide lines have been set up whereby California MCC's must operate as "radiotelephone utilities."

The state regulatory board pointed out "matters relating to private mobile radio service (lease-maintenance service) and the application of the Delta Mobile Radio Telephone Company requesting a certification of public convenience and necessity authorizing mobile radio communication service as a public utility "in certain counties" will be subjects of further study."

In its findings and conclusions in the proceedings, the California PUC stated:

"(1) Radio telephone companies, sometimes known as miscellaneous common carriers, which are licensed by the FCC pursuant to part 21 of the Commission's rules and which

offer to the public within the State of California intrastate telephone communications service, with or without the use of wires, are public utility telephone corporations as such term is defined in Section 234 of the California Public Utilities code and are subject to all applicable provisions of said code and of this Commission's general orders, except as herein modified. And

"(2) Public convenience and necessity require continuation of the California intrastate telephone service as presently offered and that utilities rendering such service should be authorized and directed to continue in operation under present rate levels and conditions of service."

The California MCC's have been directed to file tariffs with the state commission by the middle of the second week in August, similar to those on file at the FCC, along with copies of the 1960 annual reports which have been submitted to the FCC.

The PUC also offered that none of the MCC's in the state may, after the early July effective date of decision expand their operations to include any territory not previously served, except on authorization of the Commission (PUC), nor may any of the MCC's discontinue service without first making a showing before the Commission.

* Some forty-two MCC systems operate within the state furnishing two-way radio service to more than 2,400 mobile stations. Additionally, paging and signaling service is provided to in excess of 1,100 receivers. Some forty rural radio stations also operate as an adjunct to two-way mobile radio systems within the state.

Voice Scrambling Legal—Says FCC

In response to a letter addressed to the Commission from a Louisiana mobile radio sales firm, the FCC has held that the use of "voice scrambling devices" in mobile radio communications systems by aviation, citizens, industrial, land transportation, maritime and public safety radio services is "not prohibited by any of the (current) commission rules."

The agency cautioned, however, that "Even if such scrambling devices are used, it is required that call sign identification be transmitted as prescribed by the rules in clear voice and that all other technical standards and requirements be met."

The current "best seller" in the voice scrambling field would appear to be the recent entry by the Delcon Corporation of Palo Alto, California (see CH Showcase).

Private Microwave — “Protected Basis?”

The FCC has proposed a rulemaking which would formally put private microwave systems on a non-interference basis, by specifying that the assignment of frequencies above 952 megacycles in the marine, aviation, public safety, industrial and land transportation services should be on a showing that harmful interference will not be caused to existing stations.

The agency points out that the present safety-special rules “provide generally that frequencies allocated for use therein are available on a shared basis only and will not be assigned for the exclusive use of any one licensee”. The rules also generally provide, it said, “that all licensees of stations in these services shall cooperate in the use of frequencies assigned in order to minimize interference and thereby obtain the most effective use of the authorized facilities.”

HF Interference Rising 400%

The current decline of sunspot activity and the resulting mass shift to lower HF frequencies (i.e., those between three and fifteen megacycles) is going to cause the greatest world-wide congestion of this spectrum ever experienced, according to IRE experts attending a recent Washington, D.C. meeting.

Communications Propagation expert George Jacobs, addressing the conclave, told the conferees “the downward spiral of the sunspots from the peak in 1958 is expected to make totally useless all radio frequencies currently used for world-wide communications above 15 megacycles. (NOTE: This does not affect VHF and UHF users who conversely do not want or use “skip communications” as a part of their licensed systems.)

Jacobs stated, “If the current rate of growth of the HF spectrum continues, the result will be a 400 per cent increase in (interference) levels experienced today.” “And today,” he noted, “the level is already called chaotic by users of this spectrum.”

Maritime Break-Through

... “Test Bench Measurements”

This FCC has invited comments (by August 1) to a new maritime radio rule proposal which would permit frequency measurements and modulation adjustments of shipboard radio stations to be made either “with the transmitter installed aboard the vessel for which it is licensed or at a service test bench

under load conditions equivalent to actual shipboard operation.”

The agency pointed out that present requirements to make frequency measurements each time a transmitter is placed in service after a temporary removal, and similar requirements with respect to measurement of power and modulation adjustments, “place an undue burden on licensees of small boats on which a permanent installation cannot be made.”

2738, 2830 Kc. Changes

Comments are due at the FCC August 1 on a proposal to open up 2738 kc. and 2830 kc. to “limited coastal stations, on a shared basis, at causeways, bridges, waterways and similar locations.”

The agency noted “interested persons have indicated that safety and navigational considerations make it desirable that there be a direct means of communication between vessels in the vicinity of bridges, causeways, etc. and a coast station, in order that there be a safe and orderly routing and movement of vessels and to preclude property damage.”

82 Channel TV — Off Again — On Again

While the FCC was introducing legislation into Congress June 21 to require all TV receivers shipped in interstate commerce be capable of receiving all 82 VHF and UHF television channels, trade press in the broadcasting industry was hitting once again at the theme that “an all UHF system for TV appears to be gaining disfavor” at the FCC level. Adding to the confusion, Commissioner Robert E. Lee (friend of all two-way operations, as he favors an all UHF-TV situation) was stating, “It is my opinion that the public interest would be better served were television to be shifted to UHF, thereby promoting a more competitive and adequate television system and releasing the VHF bands to the needs of other services.”

Private Microwave Becomes “Regular”

The FCC has finally completed amendments to its rules authorizing for licensing private microwave communication systems on a *regular* basis as opposed to a developmental basis.

The action also adds a new rule to the rules for the marine, aviation, industrial, public safety and citizens radio services to permit waivers of “certain technical requirements on

a case-by-case basis."

At the same time, the type acceptance date has been moved ahead from July 20, 1961 to July 20, 1962.

Said the FCC, "By its very nature, a microwave system needs relief from certain of the technical requirements imposed on other systems and these will be allowed. On the other hand, it is not the Commission's intent to grant waivers on matters affecting such things as eligibility of permissible communications merely because of the microwave aspects of the proposed system. It is the Commission's decision that a rule similar to the following shall be adopted and incorporated into each of the parts concerned to permit certain applications for microwave systems to be handled on a case-by-case basis. *"Special provisions for stations operating above 952 mc.:* Stations authorized to operate on those frequencies above 952 mc. which are not restricted to assignment for developmental operation only shall be constructed and used in such a manner as to conform with all of the technical and operating requirements of subparts C and D, unless deviation therefrom is specifically provided for in the station authorization."

"The EIA has pointed out that new equipment, after July 20, 1961, will meet the established interim technical standards," the Commission explained, but had noted that the "further imposition of the type acceptance requirements . . . may result in many hardships." The agency replied by stating it feels EIA's request to move the type-acceptance a year into the future (July 20, 1962) is *reasonable*.

"Rather than grant waivers which might be construed as *open end* invitations to seek additional postponements," the Commission said, "it seems more appropriate to hold off the type acceptance requirement until July 20, 1962. It should be noted that the Commission regards this requirement as an important step in its *regularization* of private microwave operations and feels that this twelve month postponement should be ample time to permit those affected to comply with type-acceptance provisions."

At the same time the Commission noted a new form (FCC Form 402) is to be used when making applications for construction permits, licenses, modifications and assignments of licenses for microwave stations in the safety and special radio services. Another new form, FCC Form 402-10, is tabbed an "associated instruction form."

Form 402 will not be available from the Commission "for several months" and will not be required prior to November 1, 1961.

Colorado State Patrol Under Fire

... Order to "Curtail" Non-Police Operations

The FCC has advised the Colorado State Patrol that the latter "has presented no facts to justify its indefinite operation in disregard of the permissible communications provisions of the police radio rules," and in order for the Commission to grant the state agency an extension of the existing radio license, a "detailed report" on measures the state patrol has taken to get into compliance with Commission rules must be on file in Washington on or before August 1.

The Commission, in April, had listed a number of non-police functions currently being handled over the patrol's police radio system, and had directed the patrol to "rectify the objectional features" of its communication operations.

In response, the Colorado agency replied, "We are enjoying excellent success with our present communication system," and that "money is not now available for such changes as directed by the Commission." The patrol's response contained relatively little discussion of the Commission's charges as to whether its radio operations conform to the rules, but rather concentrated on considerations to support the present operation, despite the rules.

The Commission noted in replying that "efficiency of the system" does not enter into the question, only the problem of the Colorado State Patrol's system conforming to narrow band regulations, and the adoption of operating techniques that insure the system be used only for permissible police communications.

APCO Conference Expects 500 Plus

APCO Conference Chairman Foster G. Strong reported to *Communication Horizons* at press time: "About 500 communications officers from public safety agencies throughout the United States and overseas are expected to attend the Long Beach meeting scheduled for August 1-4 in the Lafayette Hotel, Long Beach, California." Your reporter hopes to see many of you there.

RET

COMMUNICATIONS IN MIAMI

By Ben Demby
Superintendent, Communications Divisions
Department of Public Safety
City of Miami, Florida

Communications has always been a prime consideration of the city of Miami in its law enforcement and public safety activity. As early as 1928—the Roaring Twenties—the vital need for centralized operations was recognized and a unit was established in the police department to answer riot calls directly from headquarters.

Many changes have taken place since that time. Each year has brought new mobility and flexibility. Miami saw its first one-way radios placed in operation in the early 1930's—broadcast equipment converted for the purpose. By 1935, the city had created its own Communications System and immediately started the construction of mobile transmitters, going on the air with the first true two-way radio system in the South.

We have had our own Communications Shop for the past quarter of a century, established to construct and maintain the necessary equipment to do an efficient job. Over the years, this has expanded into the necessary research, development and design of devices tailored to our particular needs as well as the evaluation of commercially-available equipment meeting our high-performance system requirements.

Dispatching and Operations

In total we dispatch emergency radio transmissions to our more than 600 mobile radios over seven different radio frequencies. This includes the Miami Police Department, Miami Fire Department, Building Department, Public Service Department, Traffic Engineering and the Engineering Department, the Dade County Juvenile Officer, Dade County Levee Control, Dade County Fire Department, Miami Springs Fire Department and the following Municipal Law Enforcement Agencies:

Biscayne Park	Homestead
Constable Hardison	Medley
Constable Hudson	Miami Shores
Constable Wright	Miami Springs
El Portal	South Miami
F.E.C. Railway Agent	Sweetwater
Florida City	Virginia Gardens
Hialeah Gardens	Miami Transit



New mobile radio contract between City of Miami Public Safety and General Electric Communication Products Department provided 163 new two-way units for police and fire use.

This Section also maintains an Emergency Radio Net which covers the Southeastern Coast of Florida. The purpose of this Net is to tie the major Public Safety Agencies together by radio. In the event of a major disaster, all the Cities on this Net will still have some link of communications in addition to line-wire facilities. There is a land-line teletype Net which parallels this Radio Circuit. This emergency Radio Net was originally set up by the City of Miami in 1945 and is monitored 24 hours a day with a Roll Call each morning at 9:00 o'clock. The following is a list of the Agencies on our Roll Call:

City of Miami Communications Center
American Red Cross
Broward County Civil Defense
Broward Sheriff's Office
Civil Defense Rescue Unit
Coral Gables—Stations 1 and 2
Dade County Civil Defense

Dade Public Safety
Florida Highway Patrol
Hialeah
Hollywood
Miami Beach
Miami Fire Control Mobile Unit
Miami Fire Control—Point 2
Miami Springs
North Miami
Oakland Park Police
Parkway (Florida Turnpike)
Pompano Beach
U. S. Weather Bureau

The Amateur Radio Net which is maintained by this Division was originally set up under R-A-C-E-S in 1954 and whose purpose is to maintain communications in case of a major disaster with other Amateur Radio Stations all over the United States. The Amateur Radio Net is also maintained by our Technical personnel at our Maintenance Shop.

All radio transmissions on our Radio Circuits are recorded on three 4-Channel Dictaphone Recorders.

Over 3,800,000 radio transmissions were handled over our radio systems this past year.

Teletype

Dispatching and Operations Section is responsible for the efficient operation of twelve teletype circuits.

There are approximately 24,000 numbered messages handled yearly over these circuits plus the cancellations of these messages. These messages are relayed to all stations and are in reference to: Stolen Automobiles, Missing Persons, Hold-Ups, Robberies, etc. A message may originate at any one point and then sent simultaneously to all other stations on these Nets or to any station individually at sixty words per minute.

The teletype machine is far more efficient than the telephone as it gives a written record and when sent automatically it reduces the chance for human error. This System is the most modern of its kind and the only one in the Public Safety field in the South.

The teletype circuit, however, is not as fast as radio but it can handle all routine traffic thereby leaving our radio channels for emergencies.

Operators

The City of Miami, Division of Communica-



Police dispatching room, Miami Hall of Justice.

tions, has in its employ Communications Operators (female) to maintain the Operational Section. These Operators are well trained in all types of Communications, namely, Radio Dispatching, Teletype, all phases of IBM (Key Punching, Sorter, Card to Tape, Duplicating, Verifier, Collator) equipment, operation of the Main Switchboard, Emergency Telephone Fire and Police Switchboard, Recording Machines, Speedphoto Machine, Filing and all other related Communications duties. These Operators are under the constant supervision of Communications Operational Supervisors. These Supervisors have all had five years of experience in this Division as Operators before being permitted to take the examination for Communications Operational Supervisor.

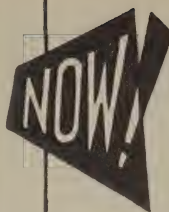
In our Alarm Office we have both male and female Operators who handle the Emergency Telephone Fire and Police Switchboard, the dispatching of all Fire equipment to the Miami Fire Department, as well as teletyping and the controlling of the traffic lights after the dispatching of fire equipment in the downtown area.

This Section is responsible for the efficient operation of the two Switchboards maintained by the City of Miami, namely, the Main Switchboard and the Emergency Fire and Police Switchboard.

The Main Switchboard is a sixteen position Switchboard which serves all of the City of Miami and the Dade Metropolitan Government. This Switchboard is designed to handle all the future requirements of both governments and was equipped for the new "Direct In-Dialing" System on August 1st, 1960 by the Southern Bell Telephone Company. This System enables the public to dial directly to any office desired and completely by-passes the switchboard operators. This has increased the efficiency better than sixty per cent. This is accomplished by dialing directly from any citizens home or business and using the prefix "FR-7-" and the extension number.

Facilities

The City of Miami's Installation and Maintenance Building at its central location, 1080 N.W. 20th Street, adjacent to the City of Miami's Motor Pool, has in all probability the most completely equipped repair section of any of its kind in the South. This shop is now maintaining some 600 mobile and 35 to 40 Base, Control and Repeater Stations.



GAIN ANTENNAS

**BUSINESS MEN'S
FREQUENCY
or TWO METERS**

(144-170 Mc)

**FIXED STATION
and MOBILE**

Engineers in the Communication Field have tried and proven GAM VHF antennas to give users the ultimate in performance. GAM antennas will give you the "marginal" signal, in most cases eliminate the "dead" spots and cut down on "picket fence" effect. These antennas are end fed through an efficient hermetically sealed matching transformer that is part of the antenna. All models are light in weight and of heavy duty construction.

MODEL TG-3-S

**FIXED STATION;
2 STACKED**

**Up to 9 db gain for
\$45.00 Net**

- Up to 9 db gain over coaxial antenna*
- Heavy duty construction
- Two half wave elements
- Can be cut to frequency
- Mounts on standard 1 1/4" pipe
- 52 Ohm Impedance
- SWR less than 1.5-1

MODEL TG-2

MOBILE ANTENNA

**Up to 6 db gain for
\$14.10 Net**

- Half wave resonant antenna
- Up to 6 db gain over coaxial antenna*
- 52 Ohm Impedance
- SWR less than 1.5-1
- Functions without additional elements
- Reduces flutter effect and extends coverage

*As frequently installed in mobile and fixed stations

CONTACT YOUR DISTRIBUTOR OR GAM DIRECT

GAM Electronics Inc.

138 LINCOLN ST. MANCHESTER, N. H.



Low Cost—High Power Two-Way

Outercom Electronics Corp. (502 Charlottemall, Charlotte, North Carolina) has announced "the first high power, low cost two-way business radio available through distributors in every major area in the United States." The unit is tabbed the Outercom FM 50A, and according to data from the manufacturer, provides 35 watts output. The complete unit, less antenna, lists at \$395 which includes the microphone and built-in power supply for either 6 or 12 volts DC and 115 volts AC.



Outercom FM — 50A.

Outercom reports one of the prime advantages of the unit is its flexible operation, being completely portable in operation from automobile to home, shop or office. No modifications are necessary and the unit need only be disconnected from the antenna and power source to be moved to a second location. A chrome handle is provided for transporting the FM 50A. Outercom notes that two such units, complete with antennas, can be installed and made ready to perk for less than

\$1000.00, thus affording "low cost communications to the small firm desiring to start out small with two-way radio. A lease plan is also available through a nationally known group which provides the user with two-way radio for a few cents per day."

Low Cost Four Channel 150 Mc. Units

AC Spark Plug, the Electronics Division of General Motors, has unveiled a new, low cost four-channel 150 mc. mobile radio-telephone designed primarily for common carrier use.



AC spark control head on tunnel.

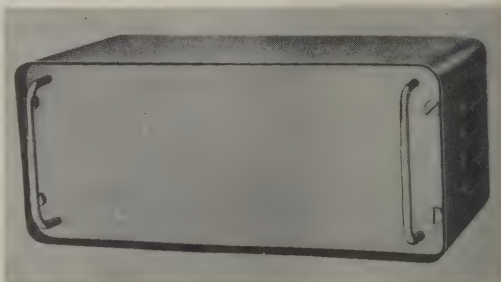
Called *ACHieverfone*, the unit is to be manufactured in AC's Milwaukee plants.

The *ACHieverfone* consists of two separate packages, a control head and the transmitter receiver unit, which mounts in the trunk.

AC announces compactness "has been achieved by designing the decoder to operate within the environments of the trunk mounting unit, thus saving space and making more compact the dash mounting control head, which contains a ringer box, junction box, channel selector and handset mount."

Instrument Case

General Metal Products Company, Easton,



G.M.P. steel cabinet.

FLASH—FAA BACKS DOWN ON TOWER REGS

. . . . Slightly

(Washington D.C. — June 19th)

The FCC announced today that a last minute change of face on the part of the Federal Aviation Agency modified slightly the detailed rule making covered in pages 18 and 19 of this issue of **COMMUNICATION HORIZONS**.

Readers are referred to that story, noting the following changes in the earlier story. FAA Administrator N. E. Halaby announced agreement with certain EIA proposals which "re-instate" the FCC twenty foot rule. This in effect means antenna towers, poles, etc. twenty feet or less (above existing structures) will not need to file any papers with the FAA.

The FAA also agreed to do away with the "thirty day rule" which would have required FCC applicants to file with the FAA thirty days prior to filing with the Commission. This means FAA and FCC papers may now be filed simultaneously.

The negotiations announced "at the eleventh hour" come in the form of a partial reprieve, following negotiations between the FCC and the FAA.

FULL DETAILS IN SEPTEMBER.

Pennsylvania, has announced a new line of steel cabinets with blank aluminum front panels, suited for control and intercom systems where lightweight transportability and sturdiness is required. The cabinet proper is twenty gauge steel, with reinforcing angles and extra ribs on the bottom. Cabinets are finished in a black krigle, and the front panel is a gloss grey. Side louvres provide ventilation, and chrome handles (illustrated) are optional. The model illustrated (GMP-100) measures 12½ inches long, 5 inches high by 5½ inches deep. Other sizes are available in the line.



AC spark trunk mounting transmitter.

The trunk mounting portion of the unit is slipped onto a base plate which is mounted on a trunk shelf, or at some other convenient location, within the trunk. The AChieverfone, operates with twenty-two watts RF output utilizing a 6883 final amplifier tube. New 7000 series tubes are used wherever possible for increased reliability.

Additional information is available through the company in care of AC Spark Plug, Milwaukee 1, Wisconsin.

Security—Plus

One of the newer gadgets making its mark on the communications marketplace provides scrambled telephone conversations between any two like units, whether the conversation is entirely along wired circuits, or over the

air between base and or mobile stations. Manufactured by the Delcon Corporation, 943 Industrial Avenue, Palo Alto, California, the Delcon Security Telephone is available in a number of models which attach simply and without wires to your standard microphone, or telephone handset. The Security Telephone converts the human voice into unintelligible jargon which cannot be understood, or even recognized as to identification as a particular human voice. A similar unit at the "other-end" of the line reconverts the unintelligible jargon into normal human speech.



Mobile and fixed radio scrambler.

The units are sold in coded pairs and the manufacturer reports "coding of these instruments is held in confidence."

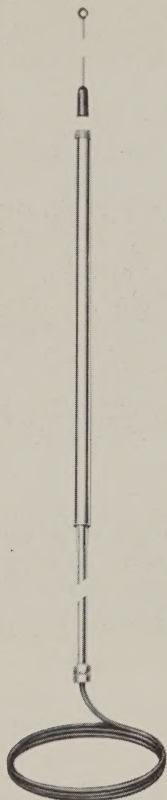
The unit is completely lightweight and portable, and may even be used on pay phones, etc. Prices vary from \$159.00 to \$249.00 per instrument.

35 Watts FM — \$299.95

General Radiotelephone Company, 2806 West Burbank, Burbank, California has just announced their first entry into the FM Business Band field, the FM-60. General reports their new thirty watt 152-174 megacycle unit is transportable (portable) and operates from 6-12 or 115 volts. Four tubes in the transmitter (captained by a ruggedized 6360) and eight tubes in the receiver (including four IF stages) complete the two-way transmitter-receiver package. Adjustable squelch is provided from the front panel. The complete price, in lots of one, \$299.95 FOB Burbank. Distributor inquiries are invited.

First Stainless Steel Mobile Antenna

Communication Products Company, Inc., well known designers and manufacturers of communication antenna systems, is announcing "the first production of a stainless steel mobile coaxial antenna."



Communications Products Co. new stainless steel antenna.

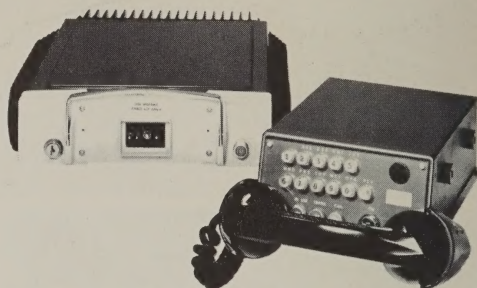
Designated Cat. No. 328-509, the new unity gain coaxial antenna features stainless steel hardware, polished stainless steel support pipe and skirt, stainless steel premium quality whip, high impact insulator, and a neoprene whip snubber. Frequency range is 144 to 174 megacycles, nominal input impedance fifty ohms, and maximum power input 150 watts. The antenna is fed with RG-58A/U. For additional information write Communication Products Company, Inc., Marlboro, New Jersey.

Transistorized Motrac

Motorola, Inc. has recently shown a pair of extensively new transistorized subscriber components for mobile dial radiotelephone sys-

tems. They are a modified version of the MOTRAC two-way radio.

The new radio telephone has a completely transistorized receiver and power supply and uses only five tubes in its twenty-five watt transmitter.



Motrac Radio — transistorized.

Occupying but 850 cubic inches, the MOTRAC radio unit takes up approximately one-half the space of conventional tube-type models. It may be installed horizontally in an automobile trunk or on a truck floor.

The complete remote control unit contains a ring alarm component, integral handset hangup brackets and a front panel with eleven lighted plastic push-buttons for number selection.

News from Raytheon

Raytheon's public relations department has been exceedingly busy during the past 30 days as evidenced by a wealth of new and interesting announcements from the Lexington, Massachusetts based firm. Of foremost interest, perhaps, to the two-way field is word that the company has developed a new 10,000-hour-life warranty on electron tubes, providing FULL coverage against catastrophic failures within 1000 hours. As a result of the announcement, Raytheon distributors will soon be stocking models 6AH6WA, 6AN5WA, 5670, 5654/6AK5W, 5755, 6414, OA2WA and 561WA with the new warranty protection. Raytheon advises "tubes ordered in lots of 100 or more will all receive full replacement guarantees if returned before the 1000 hours of operating time is logged."

NOTICE: Firms desiring product release space within these pages are advised to direct material to "New Products, Horizons Publications, P.O. Box 3207, Modesto, California."



TWO-WAY RADIO

communications equipment

VHF-FM FOR:

MOBILE
AIRCRAFT
MARINE
MOTORCYCLE
PORTABLE
BASE

VHF-AM FOR:

AIRPORT VEHICLES
GROUND STATIONS
POINT-TO-POINT

VHF

ANTENNAS
REMOTE CONTROLS
ACCESSORIES

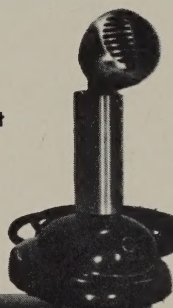


NEW! "680 BASECOM"

FOR VHF-FM TWO WAY
MOBILE RADIO

the new 680 series offers

**HIGH PERFORMANCE at
MODERATE COST with
LOW MAINTENANCE!**



"680" FEATURES AND OPTIONS:

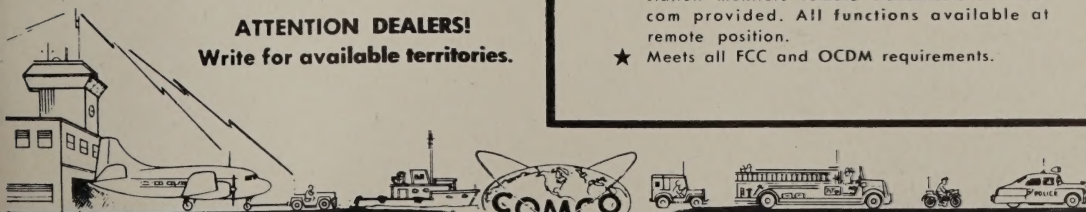
- ★ **PROVEN PERFORMANCE**... all the outstanding features of the popular "580" series, plus the following.
- ★ **HIGH POWER**... 100 watts output 25 to 50 mc, 75 watts 144 to 174 mc, both base and mobile.
- ★ **TONE SQUELCH**... two way tone squelch compatible with other systems to EIA standards.
- ★ **SIMULTANEOUS RECEPTION**... dual front end receiver for monitoring two frequencies anywhere in the band.
- ★ **TRANSMITTER FILAMENT SWITCH**... reduces battery drain when on "stand-by".
- ★ **MONITORS REMOTE CONTROL**... base station monitors remote transmissions. Intercom provided. All functions available at remote position.
- ★ Meets all FCC and OCDM requirements.

"680 FLEETCOM"

COMBINATION

- MOBILE CONTROL HEAD
- SPEAKER
- TRANSISTOR POWER SUPPLY

ATTENTION DEALERS!
Write for available territories.



DESIGNERS AND MANUFACTURERS OF

RADIO COMMUNICATIONS EQUIPMENT

COMMUNICATIONS COMPANY, Inc.

FOUNDED 1938

CORAL GABLES, MIAMI 34, FLORIDA

Announcing the NEW

150
MEGACYCLE

COMMUNICATION BAND ANTENNA SYSTEMS

FOR THE 149-174 MC BAND

BASE STATION

6.1 DB GAIN STACKED JAYPOLE

The Hy-Gain base station stacked jaypole array — Model SD-150 — produces the highest gain of any commercially manufactured 150 mc antenna; from 6.1 db omnidirectional to 9.5 db in one favored direction, with staggered jaypole positions slightly reoriented.

The Jaypole is completely factory pre-assembled, of all aluminum construction, and weighs only 19 pounds. Commercial construction withstands 100 mph winds with $\frac{1}{2}$ " radial ice load. The antenna is iridite treated to resist corrosion. \$125.70 net.

3.4 DB GAIN EXTENDED COAXIAL

The Model EX-150 is a double extended $\frac{3}{4}$ -wave coaxial antenna developing 3.4 db omnidirectional gain. Ruggedly built to withstand 100 mph winds at $\frac{1}{4}$ " radial ice load, the antenna is constructed of all aluminum, is completely iridite treated and weighs only 4 pounds. \$21.90 net.

UNITY GAIN GROUND PLANE

The Model GP-150 is a $\frac{1}{4}$ -wave standard ground plane — the lowest cost base station antenna available — yet built to commercial duty standards. All aluminum, iridite treated construction for weather-resistant, trouble-free, low-cost operation. \$5.40 net.

MOBILE

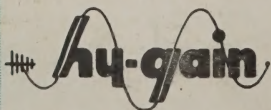
3.4 DB GAIN $\frac{5}{8}$ -WAVE WHIP

The Model MWG-150 is an extremely flexible 52" stainless steel whip for vehicular mounting in single hole. Effectively doubles receiving and transmitting power. Hermetically sealed matching inductor. Solderless RG58U connector. \$8.97 net.

UNITY GAIN $\frac{1}{4}$ -WAVE WHIP

The Model MW-150 is a rooftop mounted vehicular whip of new design incorporating a positive grip locking mechanism allowing easy mounting from top of roof. High impact cycloac molded base. Solderless connector for RG58U cable. Whip itself, easily replaceable. \$2.85 net.

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NEAREST
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OR WRITE
DIRECT TO:



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